

## Problem Session 2: Signed Integers and Floats

September 2, 2020

1. Consider a **5-bit** two's complement representation. Fill in the empty boxes in the following table. Addition and subtraction should be performed based on the rules for 5-bit, two's complement arithmetic

Number	Decimal Representation	Binary Representation
Zero	0	
n/a	-2	
n/a	9	
n/a	-14	
n/a		0 1100
n/a		1 0100
TMax		
TMin		
TMin+TMin		
TMin+1		
TMax+1		
-TMax		
-TMin		

2. The following procedure takes a single-precision floating point number in IEEE format and prints out information about what category of number it is. Fill in the missing code so that it performs this classification correctly.

```
void classify_float(float f){
    /* Unsigned value u has same binary representation as f */
    unsigned u = *(unsigned *) &f;

    /* Split u into the different parts */
    int sign = _____;    // The sign bit

    int exp = _____;    // The exponent field

    int frac = _____;    // The fraction field

    /* The remaining expressions can be written in terms of the
    values of sign, exp, and frac */

    if (_____){
        printf("Plus or minus zero\n");
    } else if (_____){
        printf("Nonzero, denormalized\n");
    } else if (_____){
        printf("Plus or minus infinity\n");
    } else if (_____){
        printf("NaN\n");
    } else if (_____){
        printf("Greater than -1.0 and less than 1.0\n");
    } else if (_____){
        printf("Less than or equal to -1.0\n");
    } else
        printf("Greater than or equal to 1.0\n");
}
```